



OIPE

ENTERED

P.6

RAW SEQUENCE LISTING  
PATENT APPLICATION: US/10/081,644DATE: 06/11/2002  
TIME: 11:09:19Input Set : A:\06501-100001.TXT  
Output Set: N:\CRF3\06112002\J081644.raw

4 <110> APPLICANT: Yamamoto, Hiroaki  
 5 Kimoto, Norihiro  
 7 <120> TITLE OF INVENTION: NOVEL ENONE REDUCTASES, METHODS FOR  
 8 PRODUCING SAME, AND METHODS FOR SELECTIVELY REDUCING A  
 9 CARBON-CARBON DOUBLE BOND OF AN ALPHA,BETA-UNSATURATED KETONE  
 10 USING THE REDUCTASES  
 12 <130> FILE REFERENCE: 06501-100001  
 14 <140> CURRENT APPLICATION NUMBER: US 10/081,644  
 15 <141> CURRENT FILING DATE: 2002-02-21  
 17 <150> PRIOR APPLICATION NUMBER: JP 2001-49363  
 18 <151> PRIOR FILING DATE: 2001-02-23  
 20 <160> NUMBER OF SEQ ID NOS: 29  
 22 <170> SOFTWARE: FastSEQ for Windows Version 4.0  
 24 <210> SEQ ID NO: 1  
 25 <211> LENGTH: 1113  
 26 <212> TYPE: DNA  
 27 <213> ORGANISM: Kluyveromyces lactis  
 29 <220> FEATURE:  
 30 <221> NAME/KEY: CDS  
 31 <222> LOCATION: (1)...(1110)  
 33 <400> SEQUENCE: 1

34 atg tca gtt cca acc act caa aaa gcc gtc atc att gaa ggt gac aaa	48
35 Met Ser Val Pro Thr Thr Gln Lys Ala Val Ile Ile Glu Gly Asp Lys	
36 1 5 10 15	
38 gct gtt aaa aca gat gtc tca gtt cca gaa tta aag gag ggt aca	96
39 Ala Val Val Lys Thr Asp Val Ser Val Pro Glu Leu Lys Glu Gly Thr	
40 20 25 30	
42 gcc ttg gtg aag gtt gag gct gtt ggt aac cca act gat ttg aag	144
43 Ala Leu Val Lys Val Glu Ala Val Ala Gly Asn Pro Thr Asp Trp Lys	
44 35 40 45	
46 cat att gct tat aag att ggt cca gaa ggt tca att cta gga tgt gac	192
47 His Ile Ala Tyr Lys Ile Gly Pro Glu Gly Ser Ile Leu Gly Cys Asp	
48 50 55 60	
50 att gct ggt aca gtt gtc aaa ctt gga cca aat gct agt act gac ttg	240
51 Ile Ala Gly Thr Val Val Lys Leu Gly Pro Asn Ala Ser Thr Asp Leu	
52 65 70 75 80	
54 aag gtt gga gat acc ggt ttc ggt ttt gtt cac ggt gct tcc caa aca	288
55 Lys Val Gly Asp Thr Gly Phe Gly Phe Val His Gly Ala Ser Gln Thr	
56 85 90 95	
58 gat cct aaa aat ggt gca ttt gct gaa tat gcc agg gtt tat cca cct	336
59 Asp Pro Lys Asn Gly Ala Phe Ala Glu Tyr Ala Arg Val Tyr Pro Pro	
60 100 105 110	
62 ttg ttt tac aag agt aac tta act cac tca act gct gat gaa att tct	384

RAW SEQUENCE LISTING  
PATENT APPLICATION: US/10/081,644

DATE: 06/11/2002  
TIME: 11:09:19

Input Set : A:\06501-100001.TXT  
Output Set: N:\CRF3\06112002\J081644.raw

63	Leu Phe Tyr Lys Ser Asn Leu Thr His Ser Thr Ala Asp Glu Ile Ser				
64	115	120	125	432	
66	gaa ggc cct gtg aag aac ttc gaa tct gct gca tca ttg cca gtt tcg				
67	Glu Gly Pro Val Lys Asn Phe Glu Ser Ala Ala Ser Leu Pro Val Ser				
68	130	135	140	480	
70	ttg aca act gct ggt gtt agt ttg tgt cat cac ttg ggc tca aaa atg				
71	Leu Thr Thr Ala Gly Val Ser Leu Cys His His Leu Gly Ser Lys Met				
72	145	150	155	160	528
74	gaa tgg cac cca tct acc ccg caa cat act cat cca tta ttg att tgg				
75	Glu Trp His Pro Ser Thr Pro Gln His Thr His Pro Leu Leu Ile Trp				
76	165	170	175	576	
78	ggt ggt gct aca gca gtg ggt caa caa cta atc caa gtt gcc aaa cat				
79	Gly Gly Ala Thr Ala Val Gly Gln Gln Leu Ile Gln Val Ala Lys His				
80	180	185	190	624	
82	atc aat gct tat act aag att gta act gtt gct tct aaa aag cat gaa				
83	Ile Asn Ala Tyr Thr Lys Ile Val Thr Val Ala Ser Lys Lys His Glu				
84	195	200	205	672	
86	aag ctt tta aag tct tat ggt gct gat gat gtc ttt gac tat cat gat				
87	Lys Leu Leu Lys Ser Tyr Gly Ala Asp Asp Val Phe Asp Tyr His Asp				
88	210	215	220	720	
90	gca ggc gtt att gag cag atc aaa tcg aag tat cca aac ctg caa cat				
91	Ala Gly Val Ile Glu Gln Ile Lys Ser Lys Tyr Pro Asn Leu Gln His				
92	225	230	235	240	768
94	gtt att gac gct gtg gga agc gaa gat atc ccc gag gcc tat aaa				
95	Val Ile Asp Ala Val Gly Ser Glu Asp Ser Ile Pro Glu Ala Tyr Lys				
96	245	250	255	816	
98	gtc aca gca gat agt cta cct gcc aca tta tta gaa gtg gtt cca atg				
99	Val Thr Ala Asp Ser Leu Pro Ala Thr Leu Leu Glu Val Val Pro Met				
100	260	265	270	864	
102	acc att gaa agc att cct gaa gaa atc aga aaa gat aat gtt aaa att				
103	Thr Ile Glu Ser Ile Pro Glu Glu Ile Arg Lys Asp Asn Val Lys Ile				
104	275	280	285	912	
106	gat att act ttg ttg tat cgt gca tct ggt caa gaa att cta ttg ggt				
107	Asp Ile Thr Leu Leu Tyr Arg Ala Ser Gly Gln Glu Ile Leu Leu Gly				
108	290	295	300	960	
110	gca aca aga ttt cct gct agt cca gaa tat cat gaa gcc aca gtt aaa				
111	Ala Thr Arg Phe Pro Ala Ser Pro Glu Tyr His Glu Ala Thr Val Lys				
112	305	310	315	320	1008
114	tcc gtt aag ttt ata aat cca cac ctt aac aac ggt gat atc cat cat				
115	Phe Val Lys Phe Ile Asn Pro His Leu Asn Asn Gly Asp Ile His His				
116	325	330	335	1056	
118	atg aat att aaa gtt ttc agc aac ggc tta gat gat gtc cca gtc				
119	Met Asn Ile Lys Val Phe Ser Asn Gly Leu Asp Asp Val Pro Ala Leu				
120	340	345	350	1104	
122	act gaa ggt ata aaa gaa ggt aaa aac aaa aat gtt aag tat gtt gcc				
123	Thr Glu Gly Ile Lys Glu Gly Lys Asn Lys Asn Val Lys Tyr Val Ala				
124	355	360	365	1113	
126	agg tta taa				
127	Arg Leu				

## RAW SEQUENCE LISTING

PATENT APPLICATION: US/10/081,644

DATE: 06/11/2002

TIME: 11:09:19

Input Set : A:\06501-100001.TXT

Output Set: N:\CRF3\06112002\J081644.raw

128 370  
131 <210> SEQ ID NO: 2  
132 <211> LENGTH: 370  
133 <212> TYPE: PRT  
134 <213> ORGANISM: Kluyveromyces lactis  
136 <400> SEQUENCE: 2  
137 Met Ser Val Pro Thr Thr Gln Lys Ala Val Ile Ile Glu Gly Asp Lys  
138 1 5 10 15  
139 Ala Val Val Lys Thr Asp Val Ser Val Pro Glu Leu Lys Glu Gly Thr  
140 20 25 30  
141 Ala Leu Val Lys Val Glu Ala Val Ala Gly Asn Pro Thr Asp Trp Lys  
142 35 40 45  
143 His Ile Ala Tyr Lys Ile Gly Pro Glu Gly Ser Ile Leu Gly Cys Asp  
144 50 55 60  
145 Ile Ala Gly Thr Val Val Lys Leu Gly Pro Asn Ala Ser Thr Asp Leu  
146 65 70 75 80  
147 Lys Val Gly Asp Thr Gly Phe Gly Phe Val His Gly Ala Ser Gln Thr  
148 85 90 95  
149 Asp Pro Lys Asn Gly Ala Phe Ala Glu Tyr Ala Arg Val Tyr Pro Pro  
150 100 105 110  
151 Leu Phe Tyr Lys Ser Asn Leu Thr His Ser Thr Ala Asp Glu Ile Ser  
152 115 120 125  
153 Glu Gly Pro Val Lys Asn Phe Glu Ser Ala Ala Ser Leu Pro Val Ser  
154 130 135 140  
155 Leu Thr Thr Ala Gly Val Ser Leu Cys His His Leu Gly Ser Lys Met  
156 145 150 155 160  
157 Glu Trp His Pro Ser Thr Pro Gln His Thr His Pro Leu Leu Ile Trp  
158 165 170 175  
159 Gly Gly Ala Thr Ala Val Gly Gln Gln Leu Ile Gln Val Ala Lys His  
160 180 185 190  
161 Ile Asn Ala Tyr Thr Lys Ile Val Thr Val Ala Ser Lys Lys His Glu  
162 195 200 205  
163 Lys Leu Leu Lys Ser Tyr Gly Ala Asp Asp Val Phe Asp Tyr His Asp  
164 210 215 220  
165 Ala Gly Val Ile Glu Gln Ile Lys Ser Lys Tyr Pro Asn Leu Gln His  
166 225 230 235 240  
167 Val Ile Asp Ala Val Gly Ser Glu Asp Ser Ile Pro Glu Ala Tyr Lys  
168 245 250 255  
169 Val Thr Ala Asp Ser Leu Pro Ala Thr Leu Leu Glu Val Val Pro Met  
170 260 265 270  
171 Thr Ile Glu Ser Ile Pro Glu Glu Ile Arg Lys Asp Asn Val Lys Ile  
172 275 280 285  
173 Asp Ile Thr Leu Leu Tyr Arg Ala Ser Gly Gln Glu Ile Leu Leu Gly  
174 290 295 300  
175 Ala Thr Arg Phe Pro Ala Ser Pro Glu Tyr His Glu Ala Thr Val Lys  
176 305 310 315 320  
177 Phe Val Lys Phe Ile Asn Pro His Leu Asn Asn Gly Asp Ile His His  
178 325 330 335  
179 Met Asn Ile Lys Val Phe Ser Asn Gly Leu Asp Asp Val Pro Ala Leu

RAW SEQUENCE LISTING  
PATENT APPLICATION: US/10/081,644

DATE: 06/11/2002  
TIME: 11:09:19

Input Set : A:\06501-100001.TXT  
Output Set: N:\CRF3\06112002\J081644.raw

180	340	345	350	
181	Thr Glu Gly Ile Lys Glu Gly Lys Asn Lys Asn Val Lys Tyr Val Ala			
182	355	360	365	
183	Arg Leu			
184	370			
186	<210> SEQ ID NO: 3			
187	<211> LENGTH: 1145			
188	<212> TYPE: DNA			
189	<213> ORGANISM: Saccharomyces cerevisiae			
191	<220> FEATURE:			
192	<221> NAME/KEY: CDS			
193	<222> LOCATION: (6)...(1133)			
195	<400> SEQUENCE: 3			
196	caaac atg tct gcc tcg att cca gaa acc atg aaa gcc gtt gtc att gaa			50
197	Met Ser Ala Ser Ile Pro Glu Thr Met Lys Ala Val Val Ile Glu			15
198	1 5 10			98
200	aat ggc aag gct gta gtc aaa cag gac att cca att cct gaa tta gaa			
201	Asn Gly Lys Ala Val Val Lys Gln Asp Ile Pro Ile Pro Glu Leu Glu			
202	20 25 30			146
204	gaa gga ttt gtt cta att aag act gtc gcc gtt gcc ggt aac cct acc			
205	Glu Gly Phe Val Leu Ile Lys Thr Val Ala Val Ala Gly Asn Pro Thr			
206	35 40 45			194
208	gat tgg aaa cat att gat ttc aag att ggt cct caa ggt gcc ctc tta			
209	Asp Trp Lys His Ile Asp Phe Lys Ile Gly Pro Gln Gly Ala Leu Leu			
210	50 55 60			242
212	ggt ttt gat gca gcc ggc caa atc gta aag ttg ggc cca aat gtt gat			
213	Gly Cys Asp Ala Ala Gly Gln Ile Val Lys Leu Gly Pro Asn Val Asp			
214	65 70 75			290
216	gct gca cgc ttt gcc att ggt gat tac att tat ggg gtt att cac ggt			
217	Ala Ala Arg Phe Ala Ile Gly Asp Tyr Ile Tyr Gly Val Ile His Gly			
218	80 85 90 95			338
220	gct tca gtg agg ttc ccc tca aac ggt gcc ttt gct gag tac tct gcc			
221	Ala Ser Val Arg Phe Pro Ser Asn Gly Ala Phe Ala Glu Tyr Ser Ala			
222	100 105 110			386
224	att tca tcc gag act gct tat aaa cca gcc aga gag ttt aga ttg tgc			
225	Ile Ser Ser Glu Thr Ala Tyr Lys Pro Ala Arg Glu Phe Arg Leu Cys			
226	115 120 125			
228	ggt aaa gac aag cta cca gaa ggc ccc gta aaa tct tta gaa ggg gca			
229	Gly Lys Asp Lys Leu Pro Glu Gly Pro Val Lys Ser Leu Glu Gly Ala			
230	130 135 140			434
232	gta tcc ctc cca gtc tca ttg acc acg gct ggt atg atc ctt aca cat			
233	Val Ser Leu Pro Val Ser Leu Thr Thr Ala Gly Met Ile Leu Thr His			
234	145 150 155			482
236	agt ttt ggc ttg gac atg aca tgg aag ccc tcc aaa gcg caa aga gat			
237	Ser Phe Gly Leu Asp Met Thr Trp Lys Pro Ser Lys Ala Gln Arg Asp			
238	160 165 170 175			530
240	caa ccc atc tta ttt tgg ggt ggt gcc act gct gtt ggc cag atg ctt			
241	Gln Pro Ile Leu Phe Trp Gly Ala Thr Ala Val Gly Gln Met Leu			
242	180 185 190			578

## RAW SEQUENCE LISTING

PATENT APPLICATION: US/10/081,644

DATE: 06/11/2002

TIME: 11:09:19

Input Set : A:\06501-100001.TXT

Output Set: N:\CRF3\06112002\J081644.raw

244	att caa ttg gca aaa aaa cta aac ggt ttc agc aag atc atc gtc gtt	626
245	Ile Gln Leu Ala Lys Lys Leu Asn Gly Phe Ser Lys Ile Ile Val Val	
246	195 200 205	
248	gct tct cgt aaa cat gaa aaa ttg ttg aaa gag tac ggt gca gat gaa	674
249	Ala Ser Arg Lys His Glu Lys Leu Leu Lys Glu Tyr Gly Ala Asp Glu	
250	210 215 220	
252	ctt ttt gac tac cac gat gct gac gtt atc gaa cag ata aaa aag aag	722
253	Leu Phe Asp Tyr His Asp Ala Asp Val Ile Glu Gln Ile Lys Lys Lys	
254	225 230 235	
256	tac aac aac att cct tac ttg gtg gac tgt gtc tcc aac aca gaa act	770
257	Tyr Asn Asn Ile Pro Tyr Leu Val Asp Cys Val Ser Asn Thr Glu Thr	
258	240 245 250 255	
260	att caa cag gtg tac aaa tgt gcc gct gat gac tta gac gct acg gtc	818
261	Ile Gln Gln Val Tyr Lys Cys Ala Ala Asp Asp Leu Asp Ala Thr Val	
262	260 265 270	
264	gtt caa ttg acc gtt tta acc gaa aaa gat atc aag gag gaa gac agg	866
265	Val Gln Leu Thr Val Leu Thr Glu Lys Asp Ile Lys Glu Glu Asp Arg	
266	275 280 285	
268	agg caa aac gtc agt att gaa gga acc ctt cta tat ttg ata gga ggt	914
269	Arg Gln Asn Val Ser Ile Glu Gly Thr Leu Leu Tyr Leu Ile Gly Gly	
270	290 295 300	
272	aac gac gtc cca ttt ggc acg ttt act ttg cca gca gac cct gaa tac	962
273	Asn Asp Val Pro Phe Gly Thr Phe Thr Leu Pro Ala Asp Pro Glu Tyr	
274	305 310 315	
276	aag gaa gcc gcc ata aaa ttt att aag ttc atc aat cca aaa atc aat	1010
277	Lys Glu Ala Ala Ile Lys Phe Ile Lys Phe Ile Asn Pro Lys Ile Asn	
278	320 325 330 335	
280	gat ggt gaa atc cac cac atc cca gtg aaa gtt tac aag aac ggg tta	1058
281	Asp Gly Glu Ile His His Ile Pro Val Lys Val Tyr Lys Asn Gly Leu	
282	340 345 350	
284	gat gat atc cca cag tta ctt gat gat att aag cac ggg agg aat tct	1106
285	Asp Asp Ile Pro Gln Leu Leu Asp Asp Ile Lys His Gly Arg Asn Ser	
286	355 360 365	
288	ggc gaa aag ttg gtt gcc gtc ttg aaa taatcttagac tg	1145
289	Gly Glu Lys Leu Val Ala Val Leu Lys	
290	370 375	
293	<210> SEQ_ID NO: 4	
294	<211> LENGTH: 376	
295	<212> TYPE: PRT	
296	<213> ORGANISM: Saccharomyces cerevisiae	
298	<400> SEQUENCE: 4	
299	Met Ser Ala Ser Ile Pro Glu Thr Met Lys Ala Val Val Ile Glu Asn	
300	1 5 10 15	
301	Gly Lys Ala Val Val Lys Gln Asp Ile Pro Ile Pro Glu Leu Glu Glu	
302	20 25 30	
303	Gly Phe Val Leu Ile Lys Thr Val Ala Val Ala Gly Asn Pro Thr Asp	
304	35 40 45	
305	Trp Lys His Ile Asp Phe Lys Ile Gly Pro Gln Gly Ala Leu Leu Gly	
306	50 55 60	

RAW SEQUENCE LISTING ERROR SUMMARY  
PATENT APPLICATION: US/10/081,644

DATE: 06/11/2002  
TIME: 11:09:20

Input Set : A:\06501-100001.TXT  
Output Set: N:\CRF3\06112002\J081644.raw

Please Note:  
Use of n and/or Xaa have been detected in the Sequence Listing. Please review the  
Sequence Listing to ensure that a corresponding explanation is presented in the <220>  
to <223> fields of each sequence which presents at least one n or Xaa.

Seq#:11; N Pos. 12  
Seq#:12; N Pos. 18  
Seq#:13; N Pos. 9

6/11/02

VERIFICATION SUMMARY  
PATENT APPLICATION: US/10/081,644

DATE: 06/11/2002  
TIME: 11:09:20

Input Set : A:\06501-100001.TXT  
Output Set: N:\CRF3\06112002\J081644.raw

L:696 M:281 W: Numeric Fields not Ordered, <221> Sort in ascending order!  
L:700 M:258 W: Mandatory Feature missing, <220> not found for SEQ ID#:11  
L:701 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:11 after pos.:0  
L:711 M:281 W: Numeric Fields not Ordered, <221> Sort in ascending order!  
L:715 M:258 W: Mandatory Feature missing, <220> not found for SEQ ID#:12  
L:716 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:12 after pos.:0  
L:726 M:281 W: Numeric Fields not Ordered, <221> Sort in ascending order!  
L:730 M:258 W: Mandatory Feature missing, <220> not found for SEQ ID#:13  
L:731 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:13 after pos.:0